1 Scope

This Engineering Guideline (EG) documents processes for the establishment and administration of the Motion Imagery Standards Board (MISB) Metadata Registry. The registry contains information about Universal Label (UL) metadata identifiers reserved for private use by motion imagery systems in the Department of Defense (DoD), Intelligence Community (IC), and National System for Geospatial-Intelligence (NSG). This EG defines the hierarchical node structure of the MISB Registry and processes for requesting, assigning, approving, and managing metadata identifiers (KLV keys).

2 References

2.1 Normative References

The following documents are necessary references for understanding and following the instructions in this guideline:

ANSI/SMPTE 298M-1997 Universal Labels for Unique Identification of Digital Data

SMPTE 336M-2001 Data Encoding Protocol Using Key-Length-Value

SMPTE 335M-2001 Metadata Dictionary Structure

RP 210.8-2004 Metadata Dictionary Registry of Metadata Element Descriptions

SMPTE 335M-2006 Metadata Dictionary Structure (DRAFT under revision)

2.2 Informative References

The following documents are useful informative references for understanding and following the instructions in this guideline:

Joint SMPTE/EBU Task Force for Harmonized Standards for the Exchange of Program Material as Bit Streams, 1997

ANSI ISO/IEC 8825-1 Information technology ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER), 15 Dec 1998

MISB EG 0104.4. Predator UAV Universal Metadata Set, 2001

SMPTE 395M-2003 Television – Metadata Groups Registry Structure

SMPTE 400M-2004 SMPTE Labels Structure

3 Introduction

The MISB Metadata Registry and the processes in this EG are the result of over five years of experience with SMPTE KLV metadata and the SMPTE RP210 Metadata Dictionary. Experience has shown that the SMPTE method of registering and managing KLV metadata keys has not kept up with the pace of motion imagery metadata development and deployment in DoD and intelligence agencies.

While many of the requirements for metadata identified by the MISB are shared with those of SMPTE there are some unique requirements that can only be met by a separate MISB Metadata Registry:

Privacy – Many aspects of metadata used by DoD and intelligence agencies, including definitions, should not be made public. There is need to register metadata whose very definitions and allowable parameters are sensitive and this requires a privately controlled Registry. Other metadata may be Unclassified but sensitive when precisely defined. In addition, sensitive applications or capabilities could be inferred from the definitions and allowable parameters and thus should also be protected. The MISB must be able to control access to its own Registry of metadata and make public only those higher-level nodes required by the SMPTE Registration Authority (SMPTE-RA).

Speed – KLV Experimental Keys were conceived by SMPTE for use by developers while new Metadata Dictionary entries were reviewed and balloted by its membership. Experience has shown that a six-month or longer approval period within SMPTE may meet commercial product development cycles but does not meet the needs of the more urgent development of systems within DoD and intelligence agencies. The goal of the MISB Registry is to approve most requests for new metadata keys in a matter of days and even the most complex to be assigned in 2-3 months or less. The MISB Registry should be a streamlined process that allows users with an urgent need for KLV key assignments to get them quickly.

Extensibility – The origin of the SMPTE Metadata Dictionary was in response to commercial requirements in the Joint SMPTE-EBU Task Force Study of 1997. Since its implementation the hierarchical structure of the Dictionary has been filled in to mostly accommodate changing commercial needs. As the KLV protocol has seen more use within DoD and intelligence agencies it has become apparent that some different and more creative structures could be implemented if they could be done quickly and privately. The MISB Registry continues to use the hierarchical Universal Label (UL) structure in SMPTE 298M but has considerable "open space" for growth and flexibility for future structures. Unless a further structure is defined below a sub-class node, new metadata element keys under the sub-class node will be assigned sequentially.

Interoperability – The requirements above motivate development of a new MISB Registry but its use must be backward compatible with metadata systems that were developed using the SMPTE Dictionary elements or which already exist. As a result, the MISB Registry has a similar, but less complex, hierarchical key structure and some keys currently used are added to the Registry so they cannot be used for other applications in the future. Parts of the Registry hierarchical structure (specifically for ASPA) must also be tailored to fit the sub-level class structure already in use by ASPA.

4 Registry Structure

The SMPTE Dictionary contains the provision for privately registered metadata in Class 14 and SMPTE-RA is responsible for registering and publishing higher-level node information. Class 14 in the SMPTE Dictionary is identified by a value of 0E (hexadecimal notation here and subsequently) in byte 9 of the UL.

The MISB Registry shall define as normative the 16 bytes of the UL. Bytes 1-8 shall be populated according to SMPTE 336M rules. Bytes 7 and 8 of the UL shall not be used for version control in the MISB Registry and shall each be set to 01 (hexadecimal notation).

Figure 1 illustrates the hierarchical structure of the MISB Registry. Nodes in the MISB Registry are further defined in the sections below.
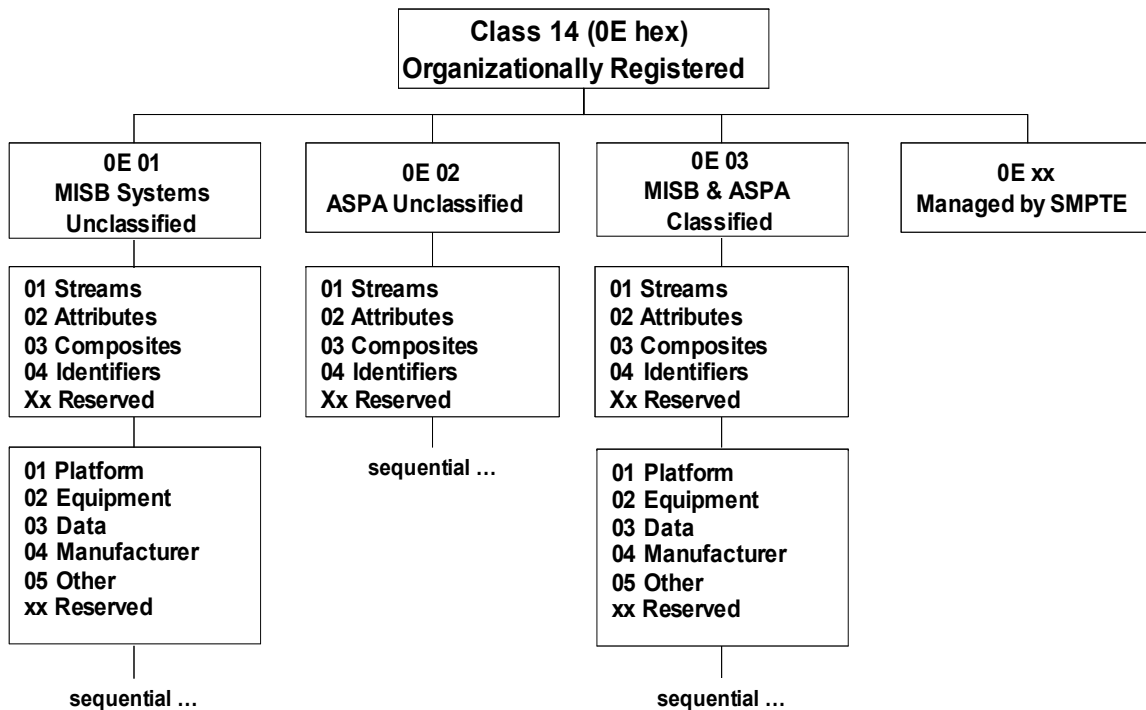

Figure 1 – MISB Metadata Registry Hierarchy Structure (Normative)

4.1 Byte 10

The first three node values in Class 14 of the SMPTE Dictionary are identified by byte 10 and are registered by SMPTE-RA to MISB and are defined as follows:

UL: **06.0E.2B.34.04.01.01.01 0E.01.00.00.00.00.00.00**
Name: MISB Systems
Definition: Unclassified metadata registered by MISB (Motion Imagery Standards Board) for Systems

UL: **06.0E.2B.34.04.01.01.01 0E.02.00.00.00.00.00.00**
Name: ASPA
Definition: Unclassified metadata registered by MISB (Motion Imagery Standards Board) for ASPA

UL: **06.0E.2B.34.04.01.01.01 0E.03.00.00.00.00.00.00**
Name: MISB Systems and ASPA Classified
Definition: Classified metadata registered by MISB (Motion Imagery Standards Board) for Systems and ASPA

Registration of any additional node values in Class 14 for use by the MISB Registry will require application to SMPTE-RA and payment of a registration and management fee.

4.2 Byte 11

Under each of the three registered nodes the MISB Registry shall further define a new node using byte 11 of the UL as follows:

0E xx 01 Streams (Data Sets and Streams) – Metadata in this sub-class are normally in streaming transport or applications. Elements in this sub-class are usually expected to change each time they are observed and their values may change either continually or sporadically. Values for these elements are most often associated with a specific observation or sample time. Examples may include metadata that varies with each video frame or according to a time tagged observation time.

0E xx 02 Attributes (Individual Data Elements) – Metadata in this sub-class are expected to be processed in combination with other attributes in the same composite structure.   Elements in this sub-class are not usually expected to change frequently with time and may be constant for large segments of a video scene. Values for these elements are static within the composite or defined context in which they are recorded. Examples may include metadata that does not change with time but elaborates upon another metadata element or the video such as the datum used in a location coordinate system or the size of a video frame.

0E xx 03 Composites (Structures, Groups, Packs, Sets) – Metadata in this sub-class are collections of other metadata elements. Elements in this sub-class almost always contain items which share a common context and registration as a Composite provides a syntax to group items together. Examples may include a Local Data Set or a file transport or application where use of this sub-class signals to processing equipment that additional parsing is required.

0E xx 04 Identifiers (Names, Numbers, Pick-Lists) – Metadata in this sub-class are persistent identifiers, local identifiers, or enumerated elements. Elements in this sub-class identify something which could be another metadata element or composite or video stream, a uniquely numbered data package or file, a physical object such as a sensor platform name, or a registration or tag such as an aircraft tail number.

Byte 11 values 05 - 7F are reserved for future use; values 80-FF are illegal and may not be used.

4.3 Byte 12

4.3.1 MISB Systems and MISB Classified

Byte 12 values describe additional sub-classes or elements for broad categories of physical objects, data, or entities as follows:

01 Platform – Related to physical transportation or movement vehicles whose purpose is to carry equipment or other objects. Examples may include aircraft, ships, ground vehicles, etc.

02 Equipment – Related to equipment such as sensors, communications, or other devices. Examples may include optical cameras, inertial navigation systems, radio receivers, etc.

03 Data – Related to non-physical or non-tangible items such as files, streams, or software. Examples may include software version numbers, video stream identifiers, object identifier (OID), etc.

04 Manufacturer – Related to information about or unique to a specific manufacturer or reserved for use by a designated manufacturer. Examples may include a manufacturer's tracking number, proprietary information, software performance parameters, etc.

05 Other – Related to other TBD information not included in the above sub-classes.

Byte 12 values 06 - 7F are reserved for future use; values 80-FF are illegal and may not be used.

4.3.2 ASPA

Byte 12 values for 01 – 7F for the ASPA sub-class and metadata elements are reserved for sequential assignment as described below. Values 80-FF are illegal and may not be used.

4.4 Sequential Key Assignment

The byte values for new assigned nodes or elements under bytes 11-16 classes shall be incremented sequentially in accordance with rules for BER OID encoding defined in SMPTE 298M except as described below.

BER OID encoding is a variable length encoding scheme that assigns groups of 7 bits right-justified in the available space. This encoding avoids embedding bytes with value 00 in the middle of the SMPTE UL. The correspondence of decimal numbers to BER OID encoded hex strings proceeds as follows:

```
1 to 127:          01        to  7F
128 to 255:        81 00     to  81 7F
256 to 383:        82 00     to  82 7F
384 to 16383:      83 00     to  FF 7F
16384 to 16511:    81 80 00  to  81 80 7F
and so on.
```

More details are provided in SMPTE 298M and ISO/IEC 8825-1.

4.5 Legacy Population

The Predator UAV Universal Metadata Set key defined in MISB Engineering Guideline EG 0104.4 is 06.0E.2B.34.02.01.01.01 0E.01.01.02.01.01.00 00 and shall be inserted into the MISB Registry to ensure backward compatibility with systems already using the assigned key.

A Class 14 node in the SMPTE Dictionary, SMPTE Groups Registry, and registered on the SMPTE-RA Web site was defined as <u>06.0E.2B.34.02.01.01.01 0E.03.01.00.00.00.00 00</u> and was titled "RQ1A Closed Caption Set." The title and description of this node has been removed from the SMPTE Dictionary, SMPTE Groups Registry and SMPTE-RA Web site because the key has never been used and is needed to complete the continuity of the MISB Registry sub-class. All research indicates that this removal will not conflict with any legacy implementation.

4.6 Registry Procedures

This section defines the administrative procedures to be used by the MISB and the individual tasked with maintaining the MISB Metadata Registry (referred to hereafter as the MISB Registrar). Figure 2 shows the approval procedures as an informative illustration.

Figure 2 – MISB Metadata Registry Approval Process (Informative)

4.7 Request Process

The procedure for creating a new entry in the MISB Registry will typically begin with a request from a system developer who has been unable to find suitable KLV keys to use in the public SMPTE Dictionary or in the existing MISB Dictionary and wishes to develop a system or application. The process begins with the requestor providing the MISB Registrar with the information shown in Annexes A and B either on-line (preferred), in softcopy as e-mail attachments, or in hardcopy.

4.8 New Key Review and Approval

One of the principal goals of the MISB Registry is to approve and assign new metadata keys quickly. How quickly keys can be approved depends on a number of factors such as:

Number of keys requested – A few keys can be reviewed and approved faster than if the request is for hundreds of new keys in a new application area.

Complexity of application – Any new application of KLV metadata will need to be understood to some level of detail. More complex applications will take longer to understand and approve.

Linkage to other standards – If new KLV metadata keys are tied to draft documents undergoing MISB review or depend on other documents that have not been approved, the request for new keys could have to wait for approval of those documents.

Detail in documentation from requestor – Lack of information from the requestor could result in delays until there is sufficient information upon which to base an approval.

Impact on similar work done by others – If the proposed application overlaps with or parallels similar work being done by others it could require more time to resolve before approval.

Backward compatibility issues – If a proposed application does not take into account backward compatibility with existing implementations this could lengthen or delay its approval until resolved.

Three types of review may be used when a request is received. All requests will first undergo Nominal Review at which point they will either be approved or sent into Exceptional or Expedited Reviews.

4.8.1 Nominal Review and Approval

Most requests for new metadata keys will fall into this category.

Administrative Review by MISB Registrar – An initial administrative review by the Registrar will determine if all the needed technical information has been provided by the requestor. Additional information may be requested to complete the information package. The Registrar will be sufficiently familiar with the SMPTE RP210 Dictionary and the MISB Registry to determine if requested keys already exist. If so, the requestor and the Registrar will mutually determine if existing keys can be used or if new keys are needed. New keys will then either be assigned immediately or, if there is still uncertainty about the application or if there is disagreement about which keys are needed, the Registrar will set up a Community of Interest (COI) online review. The administrative review process, including scheduling a COI review, must be accomplished within 5 business days from receipt of a complete request and the Registrar must provide the COI review members with a summary of actions taken and a copy of the request package.

Community of Interest (COI) Online Review – The COI online reviewers will consist of 2-5 individuals who are familiar with the SMPTE and MISB metadata standards and the workings of the MISB and MWG, plus the requestor and the Registrar. They will meet via teleconference to review the request and attempt to resolve any conflicts or issues and either recommend key assignments, recommend alternatives and work

with the requestor to revise the request, or refer the request to a group of system developers for continued examination and exceptional review. The COI review must be completed no more than 20 business days after completion of the initial administrative review. The Registrar must prepare and post minutes of the COI review to document issues discussed and decisions and recommendations made.

4.8.2 Exceptional Review

Few requests should enter this review category. Those that do reach this level will be complex and involve constructive disagreement among peer developers on the metadata application or complexity of the request.

Developers Review – The Registrar will schedule the review either via teleconference or physical meeting. The group will consist of 5 or more motion imagery systems developers approved by the MISB Chair plus the requestor and the Registrar and will meet to resolve the request for additional keys. The group will either recommend key assignments, recommend alternatives and work with the requestor to revise the request, or refer the request to a formal meeting of the MWG for continued examination and exceptional review. The developer review must be completed no more than 30 business days after completion of the COI review. The Registrar must prepare and post minutes of the developers review to document issues discussed and decisions and recommendations made.

MWG Review – The Registrar, in conjunction with the MWG Chair, will schedule an ad hoc meeting of the MWG to review the request and recommendations of the developers review. The MISB e-mail list will be used to announce the meeting which will be Unclassified (if possible). The MWG will either recommend key assignments, recommend alternatives and work with the requestor to revise the request, or refer the request to the MISB for continued examination and exceptional review. The MWG review must be completed no more than 30 business days after completion of the COI review. The Registrar must prepare and post minutes of the MWG review to document issues discussed and decisions and recommendations made.

MISB Review – The Registrar, requestor, MWG Chair, MISB Senior Scientist, and MISB Chair will meet to resolve any remaining issues with the request. The MISB review may result in additional meetings as needed and at the discretion of the MISB Chair. The MISB review must be completed no more than 30 business days after completion of the MWG review. The Registrar must prepare and post minutes of the MISB review to document issues discussed and decisions and recommendations made.

4.8.3 Expedited Review

When justified, the MISB Chair may be petitioned for expedited review and approval of metadata keys.

Justification for Expedited Review and Approval – Written justification for expedited review and approval by the MISB Chair may include extremely rapid deployment of a new motion imagery capability, highly compartmented security which precludes review by the Registrar or a COI, delays due to exceptional review that will significantly impact larger program schedule, or other extenuating circumstances which prevent the nominal or exceptional review processes from being followed.

Follow-up COI Advisory Review – When the MISB Chair approves new keys under the expedited review process there be a follow-up COI advisory review within 30 days to examine the request package, if possible, and make recommendations to the requestor if any changes to the application or implementation can be made before employment. The COI advisory review will document the expedited approval for the record.

4.9 Hardcopy Registry

A printed hardcopy of the MISB Registry will be maintained by the Registrar as backup to a softcopy Registry database. The hardcopy will also be an interim capability until a Web-enabled online Registry can be developed.

4.10 Web-enabled Online Registry

A Web-enabled online capability will be the primary and preferred form of the MISB Registry. The online Registry will contain all the normative information of the hardcopy format but may also contain informative entries to help discovery and retrieval or to further explain the normative entries. The results of all requests for key assignment will be posted on-line.

4.11 Registry Operation and Maintenance

The MISB Registry will be operated and maintained by the National Geospatial-Intelligence Agency (NGA).

4.11.1 Key Assignment and Registry Database Entry

The Registrar will assign new keys based on the initial administrative review or recommendations from subsequent reviews. Database entries and on-line notification of key assignments will be made within 2 business days following approved key assignment.

4.11.2 Unclassified Registry and Classified Annex

The Unclassified MISB Registry will be maintained on an NGA or approved contractor Unclassified server and will be accessible via the MISB MWG password-protected web site. The latest Registry will be viewable and downloadable. The MISB Registry Web site will also provide an online key request template to submit new key requests electronically.

The classified MISB Registry Annex will be maintained on an NGA server accessible via JWICS and/or SIPRNET through a classified MISB MWG web site. The latest classified Annex will be viewable and downloadable. The MISB Registry Web site will also provide an online key request template to submit new key requests electronically.

Annex A   MISB Metadata Registry Request Form (Informative)

1. Briefly describe how the requested 16-byte KLV key will be used in the KLV protocol. For example as part of a Universal Set, as stand alone elements, etc:

    _____
    _____
    _____

2. Briefly describe the application and environment in which the new KLV key will be used.

    _____
    _____
    _____

3. Reference any MISB or other specifications being reviewed but not yet published for which the KLV key is needed. (Attach documentation as needed.)

    _____
    _____
    _____

4. Briefly explain why KLV keys or KLV structures, such as Sets, that already exist either in SMPTE RP210 or the MISB Registry cannot be used.

    _____
    _____
    _____

5. Identify any experimental key that will be used until a permanent key is assigned.

    _____
    _____

6. Provide information on the urgency of the need and the timeframe in which it is needed.

    _____
    _____
    _____

7. Provide documentation on any other systems that may be impacted by the requested metadata. (Attach documentation as needed.)

    _____
    _____
    _____

8. Request permanent 16-byte keys individually by filling out the Excel spreadsheet or Web-based request page information. (Excel spreadsheet provided separately.)

Annex B   MISB Metadata Registry Contents (Normative)

<u>**Required Information**</u>

Universal Label (UL) 16-Byte Key (Normative) – The 16-byte Universal Label consists of a 2-byte UL Header, a 6-byte UL Designator, and an 8-byte Item Designator as defined in SMPTE 336M. The eight bytes of the Item Designator (last 8 bytes of the UL) uniquely identify the specific item in the Registry in a hierarchical fashion. The first byte in the Item Designator and subsequent bytes enable the hierarchical identification of subclasses and/or individual data elements.

UL Key Check Sum (CRC) (Normative) – This field is computed from the 16 bytes of the UL Key using a standard 16 bit CRC computation (reference and macro available from the MISB Registrar). The value is a pseudo unique number for each key ranging from 0 to 65536. This value provides a method for validating that a key that has been copied correctly in programs, documents or between people.

Name (Normative) – This field is the name in US English for the data element or class/subclass identified by the universal label or symbol.

Symbol (Normative) – Each Registry item may also be uniquely identified using its primary assigned symbol. A symbol consists of a string of alphanumeric characters and provides an alternative to the Universal Label for identifying an item in text-based data representations such as the Extensible Markup Language (XML) and other computer languages. To enable the use of symbols in a wide range of computer languages other than XML, symbols shall be composed only of the characters A-Z, a-z, 0-9, and _, and they shall begin with an alpha character (A-Z, a-z) or an underscore (_). Symbols are intended for machine processing, and the choice of symbol is not solely determined by linguistic criteria. Symbols are defined for both nodes and leaves.

Aliases (Normative) – In cases where software applications may use alternative spellings or other representations of the Registry item symbol they shall be listed as known aliases for information only.

Definition (Normative) – This field is the detailed and unambiguous US English language definition of the data element or class/subclass.

Tree Segment (Node or Leaf) (Normative) – For search and sorting purposes the Registry entries are identified as either nodes or leaves in the hierarchy.

Data Type (Normative) – This is the text description of the underlying data type. The description is used to determine the most appropriate type in the Types Listing reference.

Effectivity Date (Version No.) (Normative) – The date on which the Registry entry becomes effective and may be used operationally. The numerical data in YYMMDD ASCII format shall also serve as a version number for the Registry.

Value Length (Bytes) (Normative) – This entry states a default or other limitation on the length provided by the originator on the permitted length in bytes or characters of the value of the data element. In some cases, such as a text string, the length is not defined or limited, and the value length is described as variable. However, in practice, a variable length may be limited by the application specification. As the value length is used to define the corresponding type in the Types Listing, the Data Type entry shall be considered the normative reference.

Value Range (Normative) – This field states any limitation on the range of values permitted for the data element. Units shall be those identified in the Units of Measurement entry. Note that the defining document may place restrictions on the value range that have not already been defined by the underlying data type.

Allowed Values (Normative) – This Registry entry states any limitation on enumerated values allowed for the data element. Units shall be those identified in the Units of Measurement entry.

Unit of Measurement (Normative) – This field specifies standard of basic quantity or increment by which something is divided, counted, or described. This value is normative but only applicable to entries with measurement values. ISO metric standard units shall be used. An enumerated list of the units of measure should be maintained to ensure consistency.

Measurement Type (Normative) – This Registry entry defines the measurement type for the unit of measurement. E.g. Temperature Measurement Type, Angular Measurement Type, Geographical Measurement Type for "Degrees," etc. This value is normative but only applicable to entries with measurement values.

Defining Document or Standard (Normative) – If a document that provides further information about an item is available, then this field shall reference that standard or the authoritative source of the information. For example, a defining document may be used to specify the set of permissible values for an enumeration when the assigned type kind is a Basic Type rather than an Enumeration.

Other Reference Documents (Informative) – References or links to other documents that may be useful in implementing the Registry entry.

Notes or Comments (Informative) – This field can be used to provide additional information that may assist in the interpretation and correct application of the data element or a class/subclass of data elements. This information cannot be deduced from the other normative and informative fields.

Registry Administrative Information

Requestor Name (Informative) – Name of the person who requested the Registry entry.

Requestor Organization (Informative) – Organization of the person who requested the Registry entry.

Requestor Address (Informative) – Street address of the person who requested the Registry entry.

Requestor Telephone (Informative) – Telephone number of the person who requested the Registry entry.

Requestor FAX (Informative) – Fax number of the person who requested the Registry entry.

Requestor E-mail (Informative) – E-mail address of the person who requested the Registry entry.

Date Approved (Informative) – Date that the Registrar received approval to log the Registry entry.

Approver Name (Informative) – Individual or organizational name approving the Registry entry.